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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LAO, TIM P	

ART UNIT	PAPER NUMBER
2655	5

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/849,174	Applicant(s) PERRONNIN ET AL.	
	Examiner Tim Lao	Art Unit 2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the Office Action of November 6, 2003, Applicants have submitted an Amendment, filed February 24, 2004, amending claims 1 and 5, and adding claims 11-18 and arguing to overcome the art rejections. Claims 1-18 are pending in this application. Of the pending claims, claims 1 and 11 are independent claims.

Response to Arguments

2. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

3. This is a non-final Office Action in view of new ground(s) of rejection not necessitated by Applicant's amendment.

4. Applicants cited that under 35 U.S.C. 103 and MPEP 706.02(l)(1), U.S. Patent 6,141,644 is disqualified as a prior art reference. The examiner respectfully points out that the reference is qualified as a prior art reference under the 103/102(a) criteria instead of 103/102(e).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-8, 11-13, and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Acero et al. ("Speaker and gender normalization for continuous density Hidden Markov Models," May '96, hereinafter "Acero") in view of Kuhn ("Eigenvoices for speaker adaptation," Nov. '98, hereinafter "Kuhn").

Claim(s)	
1	Acero shows: A method for developing context dependent acoustic models, comprising the steps of: representing the training speech data from each of said plurality of training speakers (p.342, col.1, §1, 1st ¶ : "The error rate...") as the combination of a speaker dependent component (e.g., speaker dependent Gaussian mean vector μ : p.343, col.1, 1st ¶, eq.2) and a speaker independent component (e.g., speaker independent delta δ : p.343, col.1, 1st ¶, eq.2); representing said speaker dependent component as centroids (e.g., Gaussian mean vector μ , p.343, col.1, 1st ¶, eq.2); representing said speaker independent component as linear transformations (delta δ : p.343, col.1, 1st ¶, eq.2;) of said centroids; and *{The transformation is linear, i.e., linear combination. (p.342, col.2, 1st ¶: "The use of correlation...; p.343, eq.2)}* performing maximum likelihood re-estimation (e.g., iterative estimation: p.343, §2.2) on said training speech data of at least one of said low-dimensional space, said centroids (mean vector μ), and said linear transformations (delta δ : p.343, col.1, 1st ¶, eq.2) to represent context dependent acoustic model. Acero does not show: developing a low-dimensional space from training speech data obtained from a plurality of training speakers. Kuhn teaches:

	developing a low-dimensional space (K-space) from training speech data obtained from a plurality of training speakers. (see Abstract) It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the acoustic model of Acero to include the low-dimensional space teaching of Kuhn in order to provide a fast speaker adaptation technique. The use of low-dimensional space reduces and saves computational time to produce a result representative of the original dimension and thus, leads to a faster speaker adaptation technique.
Claim(s) 2	Acero shows: The method of claim 1 wherein said training speech data is separated by identifying context dependent data and using said context dependent data to identify said speaker independent data. (see Abstract; §2 on p.342-343) *{The delta parameter δ (offset) is speaker independent, context-dependent.}*
Claim(s) 3	Acero shows: The method of claim 1 wherein said training speech data is separated by identifying context independent data and using said context independent data to identify said speaker dependent data. (§2 on p.342-343) *{The Gaussian mean vector μ is speaker-cluster-dependent, context-independent.}*
Claim(s) 4	Acero shows: The method of claim 1 wherein said maximum likelihood re-estimation step is performed iteratively. (p.343, §2.2)
Claim(s) 5	Acero shows: The method of claim 1 wherein said linear transformations are effected as offsets (δ) from said centroids (μ). (p.342, col.2, 1st ¶: "The use of correlation..."; p.343, col.1, eq.2)

Claim(s) 6	Acero shows: The method of claim 1 wherein said maximum likelihood re-estimation step generates a re-estimated acoustic space, a re-estimated centroids and re-estimated offsets and wherein said context dependent acoustic models are constructed using said re-estimated low-dimensional space and said re-estimated offsets. (see Abstract; p.343, §2.2) Acero does not show: The acoustic space is a low-dimensional space. Kuhn teaches: developing a low-dimensional space (K-space) from training speech data. (see Abstract) It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the acoustic model of Acero to include the low-dimensional space teaching of Kuhn in order to provide a fast speaker adaptation technique. The use of low-dimensional space reduces and saves computational time to produce a result representative of the original dimension and thus, leads to a faster speaker adaptation technique.
Claim(s) 7	Acero shows: The method of claim 1 wherein said linear transformations of said centroids (mean vector μ) are represented in tree data structures (tree hierarchy: p.343, Fig.1) corresponding to individual sound units (e.g., phonetics: p.342, col.2, §2, part 1).
Claim(s) 8	Acero shows: The method of claim 5 wherein said offsets (delta δ) are represented in tree data structures (tree hierarchy: p.343, Fig.1) corresponding to individual sound units (e.g., phonetics: p.342, col.2, §2, part 1).

Claim(s) 11	Acero shows: A method for developing context dependent acoustic models, comprising the steps of: representing the training speech data from each of said plurality of training speakers (p.342, col.1, §1, 1st ¶ : "The error rate...") as the combination of a speaker dependent component (e.g., speaker dependent Gaussian mean vector μ : p.343, col.1, 1st ¶, eq.2) and a speaker independent component (e.g., speaker independent delta δ : p.343, col.1, 1st ¶, eq.2); representing said speaker dependent component as centroids (e.g., Gaussian mean vector μ , p.343, col.1, 1st ¶, eq.2); representing said speaker independent component as linear transformations (delta δ : p.343, col.1, 1st ¶, eq.2;) of said centroids; and *{The transformation is linear, i.e., linear combination. (p.342, col.2, 1st ¶: "The use of correlation...; p.343, eq.2)}* performing maximum likelihood re-estimation (e.g., iterative estimation: p.343, §2.2) on said training speech data of at least one of said low-dimensional space, said centroids (mean vector μ), and said linear transformations (delta δ : p.343, col.1, 1st ¶, eq.2) to represent context dependent acoustic model, wherein said linear transformations are effected as offsets (delta δ) from said centroids (mean vector μ), wherein said maximum likelihood re-estimation step generates a re-estimated acoustic space, a re-estimated centroids and re-estimated offsets and wherein said context dependent acoustic models are constructed using said re-estimated low-dimensional space and said re-estimated offsets. (see Abstract; p.343, §2.2) Acero does not show: developing a low-dimensional space from training speech data obtained from a plurality of training speakers. Kuhn teaches:

	developing a low-dimensional space (K-space) from training speech data obtained from a plurality of training speakers. (see Abstract) It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the acoustic model of Acero to include the low-dimensional space teaching of Kuhn in order to provide a fast speaker adaptation technique. The use of low-dimensional space reduces and saves computational time to produce a result representative of the original dimension and thus, leads to a faster speaker adaptation technique.
Claim(s) 12	Acero shows: The method of claim 11 wherein said linear transformations of said centroids (mean vector μ) are represented in tree data structures (tree hierarchy: p.343, Fig.1) corresponding to individual sound units (e.g., phonetics: p.342, col.2, §2, part 1).
Claim(s) 13	Acero shows: The method of claim 11 wherein said offsets (delta δ) are represented in tree data structures (tree hierarchy: p.343, Fig.1) corresponding to individual sound units (e.g., phonetics: p.342, col.2, §2, part 1).
Claim(s) 16	Acero shows: The method of claim 11 wherein said training speech data is separated by identifying context dependent data and using said context dependent data to identify said speaker independent data. (see Abstract; §2 on p.342-343) *{The delta parameter δ (offset) is speaker independent, context-dependent.}*
Claim(s) 17	Acero shows: The method of claim 11 wherein said training speech data is separated by identifying context independent data and using said context independent data to identify said speaker dependent data. (§2 on p.342-343) *{The Gaussian mean vector μ is speaker-cluster-dependent, context-independent.}*

Claim(s) 18	Acero shows: The method of claim 11 wherein said maximum likelihood re-estimation step is performed iteratively. (p.343, §2.2)

7. Claims 9-10 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Acero in view of Kuhn, and further in view of Kuhn et al. (U.S. Patent 6,141,644, hereinafter "Kuhn[2]").	
Claim(s) 9	The modified Acero does not show: The method of claim 1 further comprising: using said speaker dependent component to perform speaker verification. Kuhn[2] teaches: using speaker dependent component to perform speaker verification. (col.6, ll.47-58) It would have obvious to a person of ordinary skill in the art at the time of the invention was made to include the speaker verification method of Kuhn[2] in the acoustic modeling of the modified Acero in order to provide a improved method of authentication of the users in application such conducting financial transactions over the telephone (Kuhn[2], col.1, L.10-25).
Claim(s) 10	The modified Acero does not show: The method of claim 1 further comprising: using said speaker dependent component to perform speaker identification.

	Kuhn[2] teaches: using speaker dependent component to perform speaker identification. (col.6, ll.47-58) It would have obvious to a person of ordinary skill in the art at the time of the invention was made to include the speaker identification method of Kuhn[2] in the acoustic modeling of the modified Acero in order to provide a improved method of authentication of the users in application such conducting financial transactions over the telephone (Kuhn[2], col.1, L.10-25).
Claim(s) 14	The modified Acero does not show: The method of claim 11 further comprising: using said speaker dependent component to perform speaker verification. Kuhn[2] teaches: using speaker dependent component to perform speaker verification. (col.6, ll.47-58) It would have obvious to a person of ordinary skill in the art at the time of the invention was made to include the speaker verification method of Kuhn[2] in the acoustic modeling of the modified Acero in order to provide a improved method of authentication of the users in application such conducting financial transactions over the telephone (Kuhn[2], col.1, L.10-25).
Claim(s) 15	The modified Acero does not show: The method of claim 11 further comprising: using said speaker dependent component to perform speaker identification.

	Kuhn[2] teaches: using speaker dependent component to perform speaker identification. (col.6, ll.47-58) It would have obvious to a person of ordinary skill in the art at the time of the invention was made to include the speaker identification method of Kuhn[2] in the acoustic modeling of the modified Acero in order to provide a improved method of authentication of the users in application such conducting financial transactions over the telephone (Kuhn[2], col.1, L.10-25).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Lao whose telephone number is 703-305-8955. The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tim Lao
Examiner
Art Unit 2655

TL
05/24/04

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